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Neem and Bhringraj Anti-Dandruff Hair Shampoo

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ABSTRACT

This study explores the formulation and evaluation of an herbal anti-dandruff shampoo incorporating Neem (Azadirachta indica) and Bhringraj (Eclipta alba) extracts, both known for their potent antimicrobial and scalp-nourishing properties. Neem, with its strong antifungal and antibacterial activity, helps combat dandruff-causing fungi such as Malassezia, while Bhringraj promotes scalp health and supports hair growth through its anti-inflammatory and rejuvenating effects. The shampoo formulation was prepared using natural surfactants and evaluated for physicochemical properties, foaming ability, pH, stability, and efficacy in reducing dandruff. Preliminary results indicate that the combined action of Neem and Bhringraj not only reduces dandruff and scalp irritation but also enhances overall hair texture and health. This herbal formulation presents a promising, natural alternative to synthetic anti-dandruff treatments, with minimal side effects and added benefits- for hair nourishment.

Keywords: Paraben-Free Silicone-Free Hairfall Control Sulphate-Free AyurvedicParaben-Free Silicone-Free Hairfall Control Sulphate-Free Ayurvedic

INTRODUCTION

1.1) HAIR AND HAIR STRUCTURE

The root and shaft make up the basic structure of hair. The portion of hair visible above the skin is called the hair shaft, whereas the root is contained within the hairfollicle. Keratin is a protein that makes up hair and contributes to its strength. Every hair strand has a hair shaft and a hair root.The shaft is the portion of the hair shaft that is visible and extends from the skin. The hair root spreads to the deeper layers of the epidermis and is situated beneath the skin's surface. The hair follicle is encased in a layer of connective tissue and epidermis, which is also connected to a sebaceous gland. Each hair follicle is connected to a little muscle. Which allows the hair to stand up.

Many nerves also terminate at the hair follicle. Hair movement is detected by these nerves, which are sensitive to even the tiniest airflow.

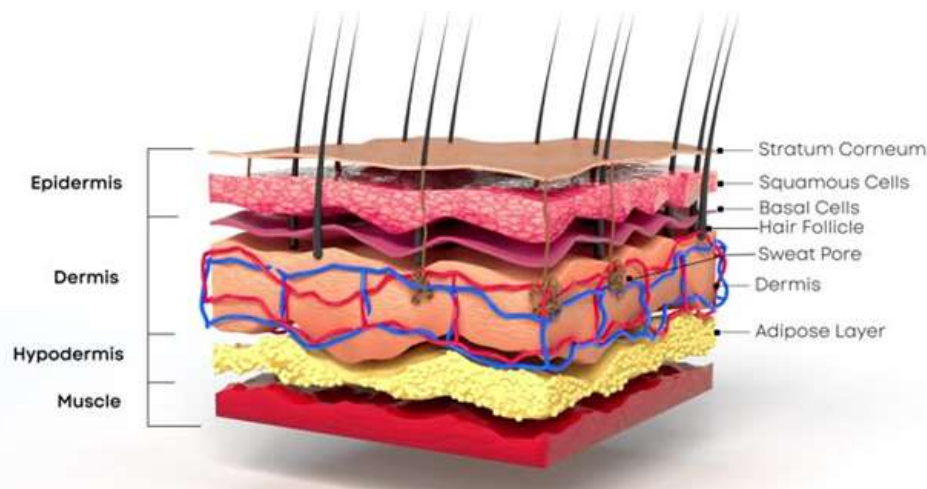



Fig no. 1

1.2 Hair Growth Cycle

Hair will continue to grow longer as long as new hair cells continue to grow in the hair bulb. This stage of development is also known as the anagen phase. At any given time, approximately 90% of a person's total hair volume is in this growth phase.

Depending on where a hair grows on the body, its growth phase may be longer or shorter: For instance, if left untrimmed, the growth phase of your head's hair can continue for several years, reaching a length of more than a meter. Eyelashes, brows, nasal hair, and ear hair all have particularly short growth phases. Since such hairs only grow for 100 to 150 days, they are unable to grow that long.

The hair root separates from the papilla at the end of the growth phase. Then a transitional phase known as the catagen phase begins, lasting two to four weeks.

When the hair has completely separated from the papilla, the blood supply is cut off in the final resting phase, also known as the telogen phase. The hair grows out of the skin gradually and eventually falls out. The resting period can last for months. For the long hair shedding function has been assumed to be part of telogen phase, but now it has been established that shedding actually occurs as a distinct termed as exogen phase.

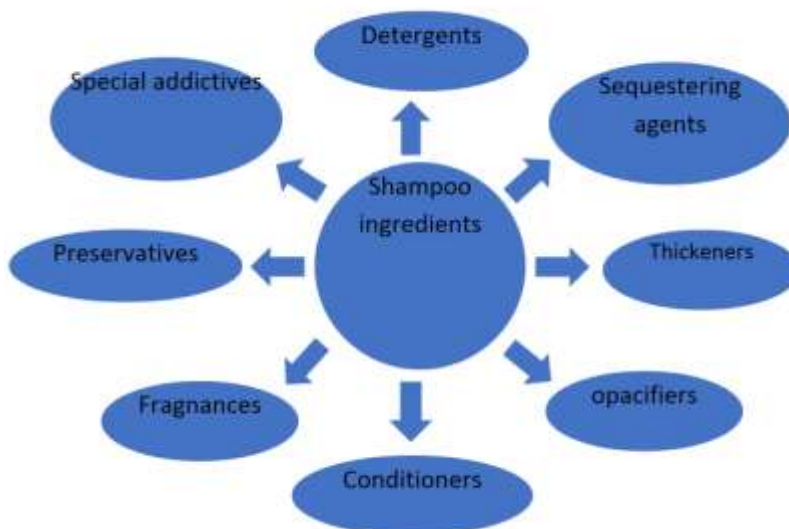
1.3 Shampoo

The most popular kind of hair product is shampoo. Their purpose is to enhance the texture and appearance of hair. Shampoo is a hair care product used to clean both the hairs and the skin of the scalp. In addition to meaning to press or massage, was used to denote cleaning through massage of the hair and skin. Traditional soaps, which were previously used for both skin and scalp, are no longer recommended for hair cleaning because they do not lather well and leave a residue when mixed with hard water that is difficult to remove.

Drene, the first shampoo to use synthetic surfactants instead of soap, introduced modern shampoo as we know it today in the 1930s.

WHAT DOES SHAMPOO DO?

It is essential to understand that the only ingredients that are important for hair cleansing and manageability are synthetic detergents and conditioners, while the rest aid in the product's stability, presentability, and marketability. As primary cleansers, shampoos typically contain synthetic detergents (syndets) or surfactants.

A detergent or surfactant is amphiphilic, which means it contains both lipophilic (oil-attracting) and hydrophilic (water-attracting) sites in its molecules. The lipophilic sites aid in the binding of sebum and oily dirt, while the hydrophilic end binds to water, allowing the sebum to be removed while washing with water.

TYPES OF SHAMPOO

1. Powder Shampoo
2. Liquid Shampoo
3. Lotion Shampoo
4. Cream Shampoo
5. Jelly Shampoo
6. Aerosol Shampoo

1.4 Dandruff And Cause Of Dandruff

Up to half of the world's population has dandruff, a flaky, itchy scalp condition, during puberty. The causes of dandruff include sebum production, malassezia, and personal sensitivity. One of the main causes of dandruff is the environmental yeast Malassezia, however the existence of the presence of Malassezia on healthy scalps indicates that it is not the sole cause. The stratum corneum (SC) functions as a barrier to maintain the scalp's moisture content by avoiding loss of water. External dangers like dangerous chemicals and germs, especially Malassezia, are also avoided. Dandruff symptoms may arise from aberrant epidermalproliferation, keratinocyte differentiation, and SC maturation brought on by severeor persistent barrier disruption. A weakened barrier is produced by more trans-epidermal water.

The loss is consistent with the reduced and disordered structural lipids found in dandruff SC. Another sign of a weakened barrier in dandruff is subclinical inflammation and increased susceptibility to topical irritants. We propose that disrupting the scalp's SC causes dandruff by altering sensitivity to Malassezia metabolites. Treatment of dandruff with cosmetics that improve SC integrity while also providing effective antifungal action may be beneficial.

1.5 Anti-dandruff Shampoo

Several anti-dandruff compounds, most notably pyrithione zinc, can suppress the lipophilic Malassezia yeasts that cause dandruff, a scalp condition that is frequently treated with anti-dandruff shampoos. However, surfactants in comparatively high concentrations are needed for solubilization because of this compound's poor solubility. Anti-dandruff products are designed to stop dandruff flakes from forming. The cause of dandruff is unknown, but treatment involves the use of a number of "actives" that act as either anti-microbial or anti-mitotic agents. The choice of "active" is determined by the regulatory requirements of the markets served.

In the US, over-the-counter (OTC) anti-dandruff products are currently permitted to contain five chemicals. The two most widely used components are selinium sulfide and zinc pyrithione. Coal-tar solution, sulfur, and salicylic acid are the other authorized "actives." Except for salicylic acid and coal tar, the other three components are employed as suspensions in shampoo formulations.

2) Material and Method

2.1 Material

➢ Surfactant
➢ Conditioning agent
➢ Foam booster and stabilizer
➢ Humectants
➢ Special additives
➢ Viscosity modifier
➢ pH modifier
➢ Fragrance and Preservatives

2.2 Ingredients for shampoo

➢ Neem oil
➢ Bhringraj
➢ Methyl paraben
➢ Salicylic acid
➢ Gum tragacanth
➢Sodium hydroxide
➢Aloe vera

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- ➢ Glycerin
- ➢ Perfume

2.3 Herbs and Excipients profile

Table no. 1

Sr. no	Commom Name	Figure	Category
1	**BHRINGRAJ** Synonym- Verbesinaprostrata L. Family- Asteraceae		1. Bhringraj oil may slow or prevent the graying process. 2. Bhringraj oil is rich in vitamins and minerals. It contains vitamin E, vitamin D, magnesium, calcium, iron. 3. Bhringraj oil has antimicrobial and antifungal properties that can help reduce dandruff. 4.Additionally, the oil is supposed to increase circulation to the scalp and has anti-inflammatory qualities that can help with psoriasis and other scalp skin irritations.
2	NEEM OIL Synonym- margosa oil Family- Meliaceae	shutterstock.com · 2373012151	1.Hydrate your hair and scalp 2.Encourage hair development that is healthy 3.hair follicles are temporarily sealed 4.Reduce greys and soothe frizz 5.Get rid of dandruff and head lice. 6. Many of these claims have yet to be investigated in scientific trials, thus their overall efficacy is unknown.
3	**Methyl paraben** Common name- Nipagin M Scientic- Methyl 4-hydroxybenzoate		1.White crystalline powder. 2.Slightly soluble in water, dissolves in organic solvents. 3.**Melting Point:** 125-128°C. 5.**Boiling Point:** 265.5°C 6.**Odour:** Faint characteristic odour. **Taste:** Slight burning taste.

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4	**Tulsi** Synonym-Ocimum sanctum Family- Lamiaceae		1.Antimicrobial (antibacterial, antiviral, antifungal) 2.Respiratory support 3.Stress and anxiety relief 4.Immunity boosting 5.Anti-inflammatory 7.Adaptogenic (helps the body adapt to stress)
5	Salicylic acid **Common name- 2-hydroxybenzoic acid or ortho-hydroxybenzoic acid**		1.**Appearance:** White, fine needle-like crystals or a fluffy white powder. **2.Solubility:** Slightly soluble in water, more soluble in organic solvents like alcohol, ether, and acetone. **3.Melting Point:** Around 158-161°C (316-322°F). **4.Boiling Point:** 211°C (412°F).
6	**Gum tragacanth** Synonym- tragacanth milkvetch resin Family- Fabaceae		**1.Emulsifying:** It's an excellent oil-in-water emulsifier, meaning it can help mix oil and water-based substances. **2.Thickening:** It can increase the viscosity of water, making it useful for thickening and suspending agents. **3.Stabilizing:** It helps to stabilize emulsions and prevent them from separating.
7	**Sodium hydroxide** **Synonym- caustic soda**		**1**.White, translucent solid at room temperature. It's hygroscopic, meaning it absorbs moisture from the air. Its melting point is 318°C and its boiling point is 1388°C. 2. It is a strong base, reacting vigorously with acids to form salts and water. It also reacts with glass, forming soluble silicates.

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8	Aloe vera Synonym-Burn aloe Family- Asphodelaceae		1.Wound Healing: Aloe vera is known for its ability to accelerate wound healing. 2.Soothing: It has soothing properties that can help alleviate skin irritations, sunburns, and burns. 3.Anti-inflammatory: It possesses anti-inflammatory properties.
9.	**Glycerin** **Synonym-** **Glycerinum.**		1. Glycerin is a clear, colorless, and odorless liquid. 2.It has a syrupy consistency, making it quite viscous. 3.It readily absorbs moisture from the air, making it suitable for use in cosmetics and other applications where moisture retention is desired.
10	**Perfume (Rose Water)**		1.Rose water acts as a gentle cleanser, removing dirt and impurities while restoring the skin's natural pH balance**.** 2.It can help hydrate the skin, reducing dryness and irritation, and soothes sensitive skin, calming conditions like eczema, rosacea, or psoriasis.

3) Preparation of Neem and Anti-dandruff Shampoo

3.1 Formulation Table

Table no. 2

Sr. no	Ingredients	Quantity	Role
1	Bhringraj	2gm	Anti-dandruff
2	Neem oil	1-4 drops	Anti-bacterial, Anti dandruff, Anti-microbial
3	Gum tragacanth	2gm	Viscosity modifier
4	Salicyclic acid	2gm	Anti-inflammatory
5	Methyl paraben	2gm	Preservative
6	Sodium hydroxide	Q.S	pH modifier
7	Glycerin	Q.S	Humectant
8	Aloe vera	Q.S	Conditioning agent
9	Perfume [Rose oil]	Q.S	Fragrance

3.2 Procedure

1. Take a clean beaker and add 2-3 drops of neem oil and 4-5 drops of tea tree oil in a beaker.
2. Triturate the Bhringraj powder, Sodium lauryl sulphate (SLS) and add it in same beaker in small quantities and stir to avoid lumps and sticky texture in formulation.
3. After the addition of triturated powders add the remaining ingredients weighed Gum tragacanth, Methyl paraben, Salicylic acid, EDTA, add Glycerine as required in the formulation.
4. After addition of some ingredients add Aloe gel, Perfume (rose oil) in formulation.
5. Addition of a perfume is for good fragrance.
6. Add distilled water quantity sufficient to 100ml.

EVALUATION STUDY

4.1 Physical Appearance/ Visual Inspection

The prepared compositions fluidity, clarity, and capacity to produce foam were assessed

4.2 Determination of pH

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C.

4.3 Determination of Percent of Solids Content

Four grams of shampoo were placed to a dry, clean evaporating dish after it had been weighed. Weighing was done on the shampoo and dish. The shampoo's precise weight was determined solely by placing the evaporating dish containing the shampoo on a hot plate and waiting for the liquid to evaporate. After drying, the weight of the shampoo alone (solids) was determined.

4.4 Foaming Ability and Foam Stability

Cylinder shake method was used for determining foaming ability. 50 ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated \only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

RESULT AND DISSCUSSION

Table no. 3

Sr. no	Parameters	Prepared Antidandruff shampoo	Marketed Antidandruff shampoo
1	Physical appearance	Ok	Good
2	pH	Good	Good
3	Foam test	Good	Good
4	Consistency	Ok	Good
5	spreadibility	Ok	Good
6	stability	Ok	Good
7	Ease of combination	Good	Good

Table no. 4

Evaluation parameter	Prepared shampoo	Marketed shampoo
pH	5.6	6
Foaming height	9ml	40 ml
% Solid content	0.9	

CONCLUSION

Excellent antifungal activity was shown by Bhringraj Powder in the current study. Bhringraj Powder was used as one of the primary antidandruff components in a shampoo formulation. When choosing the ingredients for the shampoo formulation, consideration was given to the fact that they are crucial in determining the formulation's performance, stability, and visual appeal.

The antidandru=ff shampoo was then created and tested.

In light of this, we can finally say that we have created an antidandruff shampoo using the following ingredients and its assessment criteria.

Our first goal is to create an antidandruff shampoo that is acid balanced and contains the right ingredients.

Future Prospective

The future prospects for a herbal shampoo that combines Bhringaraj and Neem are highly promising, especially as the global demand for natural, plant-based personal care continues to grow. Below is a detailed outlook considering market trends, consumer behavior, and product positioning

1. Strong Market Demand for Herbal & Ayurvedic Shampoos
Global Herbal Shampoo Market Growth: The herbal shampoo market is projected to grow at a CAGR of 6–8% over the next 5–7 years, driven by rising concerns over hair damage from chemicals and the preference for natural solutions.

2. Powerful Combination: Bhringaraj + Neem
Bhringaraj: Known in Ayurveda as a potent hair growth stimulator, it helps reduce hair fall, improve hair thickness, and nourish the scalp.
Neem: A natural antibacterial and antifungal agent, it is excellent for dandruff control, scalp infections, and itchy scalp.

3. Key Future Prospects
Targeting a specific problem—hair fall with dandruff—sets the product apart from generic herbal shampoos.
Ayurveda is gaining popularity globally. With certifications like GMP, Organic, Vegan, and cruelty-free, your product can enter premium global markets.

4. Innovation Opportunities
Adding tea tree oil, aloe vera, or shikakai can enhance efficacy and appeal.
Variants: Consider variants for different hair types (dry, oily, colored hair) or problems (anti-hair fall, anti-dandruff, cooling scalp effect).

5. Potential Challenges
Product Efficacy: You'll need clinical or user-tested results to build trust—especially if targeting global markets.

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